

AGRO-BIODIVERSITY IN NATIONAL PATHWAYS FOR FOOD SYSTEM TRANSFORMATION: CASE OF WEST AFRICA

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ABSTRACT

The challenges relating to biodiversity loss, food insecurity and climate change show the urgent need to make transition towards sustainable food systems in West Africa. To bring about such a transition worldwide, the United Nations' Food Systems Summit was held in September 2021. One of the main outcomes of the Summit was the national pathways to sustainable food systems. This review analyses whether and how agro-biodiversity is addressed in the food system transformation pathways submitted by West African countries in the framework of the Summit. The content analysis suggests that agro-biodiversity is not a central topic in the national transformation pathways. In fact, it is completely overlooked in some pathways documents, and rather marginal in others. Some national documents (cf. Burkina Faso, Ghana, Niger, Nigeria) refer to the promotion of the diversity of crops and farm animals as a means of adapting to climate change, improving livelihoods and diversifying diets thus contributing to nutrition security. Moreover, only a few measures and actions dealing with the valorisation of the neglected and underutilised species (NUS) and traditional crop varieties are included in the national transformation pathways (cf. Guinea, Liberia, Niger, Sierra Leone). The conservation, management and restoration of agro-biodiversity and agro-ecosystems are crucial to boost the transition towards nature-positive food systems in the region. Therefore, a paradigm change is needed in policy, research and practice to conserve the natural resource base and contribute to sustainable development by addressing, inter alia, food insecurity and malnutrition, rural poverty and climate change challenges.

Keywords: *biodiversity conservation, nature-based solutions, Food Systems Summit, orphan crops, transition pathways.*

INTRODUCTION

Biodiversity loss is one of the most pressing challenges that humanity faces (IPBES, 2019). Therefore, biodiversity conservation is considered vital for sustainable development and addressed in several Sustainable Development Goals (SDGs) such as SDG 2 “Zero Hunger” and SDG 15 “Life on Land” (United Nations, 2015). Biodiversity loss is mainly driven by habitat and land-use change, overexploitation of natural resources and ecosystems, climate change, pollution and invasive alien species (Millennium Ecosystem Assessment, 2005). The loss of agro-biodiversity is exacerbated by the abandonment of a wide range of edible plants, the so-called neglected and underutilised species (NUS) (Chivenge et al., 2015; Padulosi et al., 2013). Biodiversity loss is particularly a challenge in regions where the anthropogenic and natural pressure on fragile ecosystems as well as the reliance on natural resources and ecosystems are high such as the Sahel and West Africa regions. Evidence shows that the impacts of climate change will be high in Sub-Saharan Africa in general (Baarsch et al., 2020; Bakshi et al., 2019; Hassan, 2010; Lokonon et al., 2019) and the Sahel and West Africa regions in particular (Baarsch et al., 2020; Lokonon et al., 2019). West Africa is still highly dependent on agriculture for the food security and livelihoods of its population (Egbebiyi et al., 2019). Agriculture, which is predominantly rain-fed, is highly vulnerable to climate fluctuations and droughts. In this respect, Sultan and Gaetani (2016) point out that “*West Africa is known to be particularly vulnerable to climate change due to high climate variability, high reliance on rain-fed agriculture, and limited economic and institutional capacity to respond to climate variability and change*”. Meanwhile, food insecurity and malnutrition are still big challenges in West Africa. Indeed, the prevalence of undernourishment in the total population is still high in the region averaging 14.8%; it ranged from 38.9% in Liberia to 6.1% in Ghana over the period 2018–20. The situation is even worse when considering the prevalence of moderate or severe food insecurity in the total population that reached 57.8% region-wide over the same period, ranging from 83.9% in Sierra Leone to 35.1% in Cabo Verde (FAO et al., 2021). Challenges relating to biodiversity loss, food insecurity and climate change show the urgent need to make transition towards sustainable and resilient food systems in the region.

To bring about such a transition, the United Nations’ Food Systems Summit (FSS) was held in September 2021 to unleash the power of food systems in the realisation of the 2030 Agenda for Sustainable Development and the achievement of the SDGs worldwide. It aimed to deliver more sustainable, equitable, and healthier food systems (United Nations, 2021a) by working on five action tracks/areas viz. ensuring access to safe and nutritious food for all; shifting to sustainable consumption patterns; boosting nature-positive production at sufficient scales; advancing equitable livelihoods; and building resilience to vulnerabilities, shocks and stress (United Nations, 2021b). Biodiversity and ecosystems are addressed in the action track 3 “Boosting nature-based solutions” (Hodson et al., 2021). In preparing for the Summit, within the Food Systems Summit Dialogues (FSSDs), a diverse range of stakeholders were invited to identify the most powerful ways to

make food systems more sustainable. Indeed, the focus of the Summit was on the transformation of food systems. Therefore, one of the main outcomes of the FSSDs was the articulation of national pathways to sustainable, equitable and resilient food systems where national FSSDs were consolidated into clear visions of what governments and other stakeholders expect of national food systems by 2030 and worked together on exploring challenges and options to transform their food systems in the coming decade (Anonymous, 2021a). The articulation of national pathways took into consideration different factors, particularly (Anonymous, 2021a): clarifying the expectations of national food systems in the coming decade and identifying changes needed for national food systems to meet the defined expectations by 2030.

Analyses of the role of agro-biodiversity in the processes of agro-food sustainability transitions in developing countries, in general, and Sub-Saharan ones, in particular, are hard to find (El Bilali, 2019). In this context, the present article analyses whether and how agro-biodiversity is addressed in the food systems transformation pathways in West Africa. In particular, the paper analyses the measures included in the pathway documents to address the conservation and management of agro-biodiversity as well as the valorisation of orphan crops (cf. NUS).

METHODS

Cohen Shacham et al. (2016) defined the term Nature based Solutions (NbS), an overall concept that was used for nature positive food systems in the context of the Food Systems Summit accordingly. It is based on three pillars: protection, sustainable management and restoration of (agro)ecosystems (Figure 1). According to Hodson et al. (2021), “*Nature positive food systems are characterized by a regenerative, non depleting and non destructive use of natural resources. It is based on stewardship of the environment and biodiversity as the foundation of critical ecosystem services, including carbon sequestration and soil, water, and climate regulation. Nature Positive Food Systems refer to protection, sustainable management and restoration of productive system. Finally, nature positive food systems cover the growing demand for food in a sufficient way and include sustainable and healthy nutrition*” (p. 4). The themes covered by national pathway documents regarding the action area 3 “Boosting nature-based solutions” include agrobiodiversity; agroecology; aquatic/blue foods; halting deforestation and conversion from agricultural commodities; land management; nature-positive innovation; restoring grasslands, shrublands and savannahs; soil health; sustainable livestock; sustainable productivity growth and water (United Nations, 2022).



Figure 1. The three pillars of nature positive food systems: protection, sustainable management and restoration.

Source: Adapted by Hodson et al. (2021) from Cohen Shacham et al. (2016).

The present article focuses on the West Africa region viz. Benin, Burkina Faso, Cape Verde/Cabo Verde, the Gambia, Ghana, Guinea, Guinea-Bissau, Ivory Coast/Côte d’Ivoire, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo. A content analysis was performed to see how biodiversity, one of the themes of the action area on boosting nature-based solutions, is addressed in the pathways submitted by West African countries in the framework of the UN Food Systems Summit (Table 1).

Table 1. National pathways for food systems transformation submitted by West African countries.

West African country*	Transformation pathway document title**/***	Reference
Burkina Faso	<i>Feuille de route nationale en vue de la transformation des systèmes alimentaires pour soutenir l’Agenda 2030</i>	Anonymous (2021c)
Gambia	Articulating National Pathways for Food Systems Transformation in Support of the 2030 Agenda: A Strategic National Pathway Document	Ministry of Agriculture – The Gambia (2021)
Ghana	Pathways to Ghana’s food systems transformation	Anonymous (2021h)

West African country*	Transformation pathway document title**/***	Reference
Guinea	<i>Feuille de route nationale de transformation des systèmes alimentaires pour l'atteinte des Objectifs de Développement Durable en Guinée</i>	Anonymous (2021b)
Liberia	Liberia's food systems dialogues outcomes & pathways	Anonymous (2021e)
Mauritania	<i>Note explicative et de justification du contenu de la feuille de route</i>	Anonymous (2021g)
Niger	<i>Feuille de Route pour opérationnaliser les voies de transformation des Systèmes Alimentaires pour une Alimentation Saine à l'horizon 2030 au Niger</i>	Anonymous (2021d)
Nigeria	Nigeria national pathways to food systems transformation	Anonymous (2021f)
Senegal	<i>Projet de feuille de route du Sénégal pour le Sommet mondial sur les systèmes alimentaires durables</i>	Ministère de l'Agriculture et de l'Équipement Rural – Sénégal (2021)
Sierra Leone	United Nations Food System Summit: Pathways to attain sustainable access to safe and nutritious foods for all in Sierra Leone	FSS Technical Working Group (2021)

* The following West African countries have no profiles on the website of the Food Systems Summit 2021 (<https://summitdialogues.org/explore-countries>): Cape Verde, Guinea-Bissau and Togo.

** No transformation pathways were submitted as of 20 April 2022 by Benin, Ivory Coast and Mali.

*** In case different pathway versions have been submitted, only the most recent one was considered.

The methodology used was informed by that utilised by WWF (2021) in their analysis of the action track 3 “Boosting nature-based solutions” in the documents submitted by member states (viz. national dialogues feedback forms, national pathways, pre-summit statements, summit statements). In particular, during the content analysis on agro-biodiversity, the following keywords were used (translated into French, if any): agrobiodiversity, genetic diversity, crop diversity, diversification, forgotten crop, neglected crop, traditional crop, indigenous crop, neglected species, underutilised species, NUS, gene bank, seed bank, variety, cultivar, breed.

RESULTS AND DISCUSSION

In *Nigeria*, the recommendations from the dialogues have been grouped into 6 solution clusters (Anonymous, 2021f). Cluster 4 “Increase demand for, and consumption of adequate, nutritious, and healthy foods, including in humanitarian contexts” contemplates promoting homestead food production and the use of traditional vegetables (Table 2). Meanwhile, cluster 6 “Linking research, innovation, and extension for a sustainable food system” focuses on breeding for resilience (Anonymous, 2021f). In *Niger*, the conservation and promotion of agro-biodiversity are foreseen in the context of the third pathways towards sustainable food systems¹ concerning the promotion of priority value chains of food products with high nutritional and commercial potential, particularly those of fruits and vegetables, legumes (cowpea), fish, milk and dairy products, meat, dry cereals (millet, sorghum) and non-timber forest products (e.g. moringa). Within this pathway, diversification of plant and animal productions as well as the sustainable management of the environment and natural resources are foreseen in the framework of the action plan 2021-2025 of the initiative 3N (I3N – Nigeriens Nourish Nigeriens) (Anonymous, 2021d). *Burkina Faso* highlights in its national pathway document the importance of agro-ecology, agro-forestry and organic farming for improving the diversity of not only agro-ecosystems but also diets. It also calls for land conservation and the reclamation of degraded lands as well as the valorisation of local breeds. The country also highlights the need for close collaboration between producer organizations and research actors to have improved seeds and high-yielding varieties that resist attacks from pests and are resilient to climate change (Anonymous, 2021c). While such efforts might allow valorising the local varieties, they might also lead to the erosion of the local crop patrimony if imported varieties are promoted to the detriment of local, traditional ones.

Table 2. Agro-biodiversity in national pathways for food systems transformation in West Africa.

Country	Measures and actions related to agro-biodiversity-	Source
Burkina Faso	Enhancement of the genetic potential of local breeds	Anonymous (2021c)
Ghana	Developing a comprehensive strategy towards ensuring seed and breed security, achieving food sovereignty and enhancing biodiversity Research on recipes that cover indigenous crops, fruits, vegetables and other local products.	Anonymous (2021h)

¹ Other pathways concern: improving the governance and financing of food systems; promoting administrative and legislative reforms in food systems; strengthening research and innovation for sustainable food systems; supporting resilience building and recovery; making quality statistical data available and strengthening sector information and monitoring-evaluation systems.

Country	Measures and actions related to agro-biodiversity-	Source
Niger	Promotion of priority value chains of food products with high nutritional and commercial potential	Anonymous (2021d)
Nigeria	Promoting homestead food production and animal husbandry with improved varieties for household consumption Promoting the use of traditional/local vegetables for the preparation of meals for school feeding programmes, hospitals, military, and other public institutions Developing resilient crop seed varieties, livestock, and aquaculture	Anonymous (2021f)

In the case of the *Gambia*, the 3rd milestone of the national food system transformation pathway is about “Sustainable exploitation of the country’s natural resource base” but apart from a broad reference to mainstreaming conservation agriculture in the agricultural policies and enacting soil and water regulations – which can have positive externalities in terms of biodiversity conservation and management – there is no specific action or measure on agro-biodiversity in the country. It is even more surprising that biodiversity is not considered a part of the natural resource base in the *Gambia*. *Sierra Leone* identifies some expectations relating to agro-biodiversity such as increasing agricultural production and productivity (intensification and diversification) among the rural poor smallholders through a variety of support measures, and establishing supply chains for inputs such as high-yielding seed varieties and livestock breeds (FSS Technical Working Group, 2021) but there are no specific measures in the national pathway regarding agro-biodiversity. *Senegal* considers that agro-silvo-pastoral and fisheries production systems are moderately sustainable due, in particular, to practices that degrade natural resources, disrupt ecosystems and reduce biodiversity (Ministère de l’Agriculture et de l’Équipement Rural – Sénégal, 2021) but apart from the initiation of an integrated program for the recovery of degraded land and the promotion of agroecology, which might contribute to the restoration of agro-ecosystems, there is no specific intervention on agro-biodiversity. Likewise, *Guinea* highlights that sustainable agriculture can reduce deforestation and promote healthy terrestrial ecosystems, and lists encouraging reforestation and protection of degraded areas as one of the priority axes in its national pathway (Anonymous, 2021b) but with no specific reference to agro-biodiversity. *Mauritania* refers to the promotion of agro-pastoral practices that respect the environment and organic farming (Anonymous, 2021g) without providing further details.

Many countries in the region (e.g. Burkina Faso, Ghana, Senegal, Niger) highlight the need to promote *agroecological practices* to reap their multiple benefits

(Anonymous, 2021h, 2021d, 2021c; Ministère de l’Agriculture et de l’Équipement Rural – Sénégal, 2021). For example, Ghana (Anonymous, 2021h) puts that “*Agroecology, in practice, encompasses conservation, regenerative and climate-smart agriculture as well as biodiversity conservation and sustainable land management practices which involve minimal use of external agrochemical inputs*”. Similarly, some countries (e.g. Ghana, Senegal) refer to the food sovereignty concept (Anonymous, 2021h; Ministère de l’Agriculture et de l’Équipement Rural – Sénégal, 2021) also when addressing the issue of the availability of seeds at national and local levels.

The findings are in line with those of the analysis of the feedback forms of the member state dialogues, which shows that there is a recognition that food systems generate environmental impacts as well the urgency of ensuring food and nutrition for all while reducing the environmental footprint of the current food consumption and production patterns (United Nations, 2021c, 2021e, 2021d). The dialogues outcome documents stress the importance of valuing nature to consider the real, full cost of food. They also highlight that nature – both ecosystem services and biodiversity – should be valued properly and managed sustainably with an appropriate, balanced mix of preservation/conservation and regeneration/renaturation measures. This calls for well-functioning and effective policies and regulatory frameworks – at international, regional, national and local levels – that can, among others, promote the development of seed banks, payments for producers’ contributions to nature, and appropriate changes in legislation on land use (United Nations, 2021e).

Some NUS featured prominently in the summit dialogues and, consequently, in the national transformation pathways of West African countries such as cassava in *Liberia* (Anonymous, 2021e), sweet potato in *Sierra Leone* and *Guinea* (Anonymous, 2021b; FSS Technical Working Group, 2021), moringa in *Guinea* and *Niger* (Anonymous, 2021b, 2021d). Limited access to high-yield cassava varieties was identified as one of the hindrances that farmers face to expand cassava production in *Liberia* (Anonymous, 2021e). *Sierra Leone* posits the limited availability of innovations for improving livestock breeds and crops varieties, bio-fortification (e.g. orange-fleshed sweet potatoes) and usage of agricultural biodiversity (e.g. traditional leafy green vegetables) among the major challenges of its food system (FSS Technical Working Group, 2021) but there is no specific measure regarding the NUS. Furthermore, different countries such as Liberia, Nigeria, Mauritania, Guinea, Niger and Burkina Faso highlight the importance of growing and sourcing food locally (Anonymous, 2021e, 2021g, 2021f, 2021b, 2021d, 2021c), which might contribute to the promotion of NUS. For instance, *Nigeria* considers producing blended foods from local food sources for the prevention and management of moderate acute malnutrition (Anonymous, 2021f).

CONCLUSIONS

This review paper analyses whether and how agro-biodiversity is addressed in the transformation pathways submitted by West African countries within the UN Food

Systems Summit. The analysis suggests that agro-biodiversity is not a central topic in the national transformation pathways. In fact, it is completely overlooked in some pathways documents, and rather marginal in others. Some pathways refer to the promotion of the diversity of crops and farm animals as a means to adapt to climate change, improve livelihoods and living conditions of rural communities as well as diversify diets thus contributing to nutrition security. While the productivism-inspired approach of West African countries, focusing on the increase of agricultural production and productivity, might be understandable in the short term, as these countries suffer from malnutrition and food insecurity, it might result short-sighted and unsustainable in the long run. Indeed, agriculture intensification might lead to the degradation and depletion of the natural resource base, including local crop and animal resources. A growing body of evidence suggests that there can be no sustainable and resilient food systems without the conservation, sustainable management and restoration of agro-biodiversity and agro-ecosystems. Therefore, a change of paradigm with the promotion of agro-ecological practices and methods and nature-positive solutions in agriculture and food systems is needed in policy, science and practice realms. In this context, the valorisation of NUS is crucial since these neglected and underutilised crops can contribute not only to food and nutrition security, especially in poor households and remote communities, but also to food system sustainability and resilience. This, in turn, requires investments in research, innovation and dissemination of knowledge and good practices (in, inter alia, production, conservation/storage, processing, use) of NUS with the involvement of all actors of the agricultural knowledge and innovation system (AKIS) in West Africa.

ACKNOWLEDGMENTS

This work was carried out within the project SUSTLIVES (*SUSTaining and improving local crop patrimony in Burkina Faso and Niger for better LIVES and EcoSystems* - <https://www.sustlives.eu>), of the DeSIRA initiative (Development Smart Innovation through Research in Agriculture), financed by the European Union (contribution agreement FOOD/2021/422-681).

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